

causes the total operative pressure of the solution to be that of only the solvent present in it. Now, I have shown that if we take a solution such as that of propyl alcohol in water, and place it in a semipermeable vessel surrounded by water, the latter will pass through towards the solution, *ergo*, the vessel is permeable to water but impermeable to the alcohol; but if the same vessel with its same contents is surrounded by propyl alcohol, it is the alcohol that passes through towards the solution, *ergo*, the vessel is permeable to the alcohol, but not to the water, and must, therefore, at the same time, be both permeable and impermeable to each substance; which is absurd. The obvious conclusion to draw from this experiment is, that it is the solution, and not either of the substances separately, to which the membrane is impermeable, and this is just what we should anticipate on the hydrate theory, the molecules of hydrates being necessarily larger than those of their constituents.

As to ionic dissociation: When one molecule of sulphuric acid is added to 100 molecules of water, if no change occurs, we shall have a total of 101 molecules, entities or acting units, whatever they may be called; if hydrates are formed, we shall have less than 101 acting units; and if dissociation occurs, we shall have more than 101. Relying on the depression of the freezing-point, the dissociationists maintain that this last is the case, and that something between 101 and 103 acting units are present; but, if this method is really to be trusted, it proves too much, for by measuring the depression of the freezing-point of a large bulk of acetic acid produced by adding to it bodily the $100\text{H}_2\text{O} + \text{H}_2\text{SO}_4$, we find that this mixture contains very considerably less than 100 acting units, instead of more.

The explicit evidence afforded by such experiments surely calls for some comment on the part of those whose theories seem to be negatived by it, and their silence on the subject is so significant that it is surprising that it should not have attracted more attention than it has.

The strong evidence of the existence of compounds such as hydrates in solutions, both concentrated and weak, is inconsistent with that perfect freedom of molecules and atoms postulated by the dissociationists, but the discussion of this evidence cannot be attempted here.

The hydrate theory did not lead, and probably never would have led to an explanation of that peculiar behaviour of electrolytes which simulates dissociation, but, as I showed some years ago (*Ber. deutsch. chem. Gesell.*, and, in outline, in an article on Solutions in "Watts' Chemical Dictionary"), the theory is perfectly consistent with the observed facts, and, further, affords an explanation of them, which is free from the serious objections attaching to the dissociation theory.

Bath, December 23, 1896. SPENCER PICKERING.

Some Neural Descriptive Terms.

IN a recent circular asking the opinion of experts as to the prevailing and preferred usage of anatomic and neurologic terms, on behalf of the projected Dictionary of Philosophy and Psychology, Dr. C. L. Herrick mentions certain terms and principles which have been either proposed or adopted by me.

But for the request to "respond as early as possible," I should suggest that replies be either delayed or regarded as provisional until after the appearance of my paper, "Neural Terms, International and National" (*Journal of Comparative Neurology*, vi. pp. 216-340, December 1896), wherein the general subject is discussed at length, and in parallel columns are given the neuronyms adopted by the Anatomische Gesellschaft in 1895, and those now preferred by me. But for the remoteness of Dr. Herrick's present address the following comments would be submitted to him first.

3 (b). For the part now called by the Gesellschaft "Substantia perforata lateralis," I formerly proposed *præperforata*, but since 1889 have employed *præcricbrum*.

4 (e). *Metencephalon*, as employed in the last three editions of "Quain," and adopted by me in 1881, designates the last definitive encephalic segment, *i.e.* between the cerebellar segment (our ependecephalon) and the myelon or spinal cord. As given in the circular, it has two other usages, *viz.* either for the cerebellar segment alone (His), or for both regions (some authors). The encephalic segments will form the subject of a paper at the coming meeting of the Association of American Anatomists.

(g). *Metencele* is doubtless a misprint for *metacele*. The Latin (international) forms are *metacelia* and *mesocelia*; the national English forms *metacele* and *mesocèle*.

(j). As to *Neuron* (proposed by me in 1884 as a mononym for *axis cerebro-spinalis*) see "Reference Handbook," ix. 100, and *Proceedings Assoc. Amer. Anat.*, 1895, 44-45. Indirect endorsement of it is contained in such compounds as *neuromere*, *neuenteric*, &c. In like manner *myelencephalon* (for either the entire cerebro-spinal axis or for the last encephalic segment) embodies indirect endorsement of *myelon* for *medulla spinalis*.

As to *cephalic* and *caudal*, *cephalad* and *caudad*, during an experience of sixteen years no actual instance of misapprehension has been observed. But since they evidently are not acceptable to some, might not the increasing employment of *præ* and *post* in composition with the force of adjectives justify taking these prepositions as the bases of adjectives, *viz.* *præalis*, *postalis*; Eng., *præal* and *postal*; adverbs, *præad* and *postad*? As mere vocabularies the last two are no more objectionable than *quoad*.

Classic precedents for the derivation of adjectives from prepositions or adverbs are *contrarius*, *extraneus*, *proprius*, *crastinus*, *pristinus*, *interior*, *superius*, and *ἀντρέπος*.

Ithaca, N.Y., December 19, 1896. BURT G. WILDER.

Measurement of Crabs.

IN his letter of December 3, Mr. Cunningham suggests that if the young crabs be compared so that the frontal ratio is taken as the standard of comparison between the respective groups of the two years, the difference will be one of carapace length only, and this may be due to variation in the food supply. But he does not explain why the effect of the supposed variation in the food supply should be confined to the one dimension of carapace length, and not extend to the frontal ratio also. There is no evidence to lead us to suppose that the change of frontal ratio is a more accurate criterion of development than carapace length; but whichever be taken as a basis for comparison, the result is a change of shape in the carapace as between the two years.

I have, however, to make a correction as to the *adults*, two groups of which, belonging to different years, I compared in my paper as being equal and comparable. I had reason for thinking that they were equal; but I regret to say that a more accurate investigation of them, to which I was led by Mr. Cunningham's criticisms, shows me that they were not so, and that the inequality was not a natural one, but was due to an unconscious selection in the process of collecting them; and therefore these two groups are not comparable, and must be eliminated from a consideration of the question.

December 28, 1896.

H. THOMPSON.

Marriage of the Dead.

MARCO POLO narrates of the Tartar tribes thus:—"They have another notable custom, which is this. If any man have a daughter who dies before marriage, and another man have had a son also die before marriage, the parents of the two arrange a grand wedding between the dead lad and lass. And marry them they do, making a regular contract! And when the contract papers are made out they put them in the fire in order that the parties in the other world may know the fact, and so look on each other as man and wife. And the parents thenceforward consider themselves sib to each other just as if their children had lived and married. Whatever may be agreed on between the parties as dowry, those who have to pay it cause to be painted on pieces of paper, and then put these in the fire, saying that in that way the dead person will get all the real articles in the other world" (Yule, "Book of Ser Marco Polo," 2nd ed., vol. i. pp. 259-260). On this narration of Polo, the late Colonel Yule, quoting the authors of later date, remarks that "this is a Chinese custom, though no doubt we may trust Marco for its being a Tartar one also" (p. 260).

As it is not well known whether or not there is a record of this strange custom earlier than the beginning of the dynasty of Yuen, I was in doubt whether it was originally common to the Chinese and Tartars until I lately came across the following passage in "Tsoh-mung-luh" (Brit. Mus. copy, 15297, a 1, fol. 11-12), which would seem to decide the question—"In the North there is this custom. When a youth and a girl of marriageable ages die before marriage, their families appoint a match-maker to negotiate their nuptials, whom they call 'Kwei-mei' (*i.e.* 'Match-maker of Ghosts'). Either family hands

over to another a paper noticing all pre-requisites concerning the affair; and by names of the parents of the intended couple asks a man to pray and divine; and if the presage tells that the union is a lucky one, clothes and ornaments are made for the deceased pair. Now the match-maker goes to the burying-ground of the bridegroom and, offering wine and fruits, requests the pair to marry. There two seats are prepared on adjoining positions, either of which having behind it a small banner more than a foot long. Before the ceremony is consecrated by libation, the two banners remain hanging perpendicularly and still; but when the libation is sprinkled and the deceased couple are requested to marry, the banners commence to gradually approach till they touch one another, which shows that they are both glad of the wedlock. However, when one of them dislikes another, it would happen that the banner representing the unwilling party does not move to approach the other banner. In case the couple should die too young to understand the matter, a dead man is appointed as a tutor to the male defunct, and some effigies are made to serve as the instructress and maids to the female defunct.¹ The dead tutor thus nominated is informed of his appointment by a paper offered to him, on which are inscribed his name and age. After the consummation of the marriage the new consorts appear in dreams to their respective parents-in-law. Should this custom be discarded, the unhappy defuncts might do mischief to their negligent relatives. . . . On every occasion of these nuptials both families give some presents to the match-maker ('Kwei-mei'), whose sole business is annually to inspect the newly-deceased couples around his village, and to arrange their weddings to earn his livelihood."

This passage is very interesting, for, besides giving us a faithful account of the particulars, which nowadays we fail to find elsewhere, it bears testimony to the Tartar, and not Chinese, origin of this practice. The author, Kang Yu-chi, describes himself to have visited his old home in Northern China shortly after its subjugation by the Kin Tartars in 1126 A.D.; so there is no doubt that among many institutional novelties then introduced to China by the northern invaders, Marriage of the Dead was so striking that the author did not hesitate to describe it for the first time.

According to a Persian writer, after whom Pétis de Lacroix writes, this custom was adopted by Jenghiz Kân as a means to preserve amity amongst his subjects, it forming the subject of Article XIX. of his Yasa promulgated in 1205 A.D. The same writer adds:—"This custom is still in use amongst the Tartars at this day, but superstition has added more circumstances to it: they throw the contract of marriage into the fire after having drawn some figures on it to represent the persons pretended to be so marry'd, and some forms of beasts; and are persuaded that all this is carried by the smoke to their children, who thereupon marry in the other world" (Pétis de Lacroix, "History of Genghizcan the Great," trans. P. Aubin, London, 1722, p. 86). As the Chinese author does not speak of the burning of papers in this connection, whereas the Persian writer speaks definitely of its having been added later, it seems that the marriage of the dead had been originally a Tartar custom, with which the well-known Chinese paper-burning was amalgamated subsequently between the reigns of Genghiz and his grandson Kublai—under the latter Marco witnessed the customs already mingled, still, perhaps, mainly prevailing amongst the Tartar descendants.

KUMAGUSU MINAKATA.

The Heating of Anodes in X-Ray Tubes.

IN reply to Mr. Walter Chamberlain's inquiry (p. 198), it must be borne in mind that spark length is not *per se* a criterion of the energy delivered to a vacuum tube. The length of spark is more or less proportionate to the maximum E.M.F. of the discharge, while the energy of a discharge depends upon the nature of the curves of both E.M.F. and current, and may bear but a small relation to the maximum E.M.F. Large coils which have secondary wire of considerable section and comparatively large electrostatic capacity, give a much greater electric quantity and, consequently, much more energy for each discharge, even when worked so as to give only short sparks, than do smaller coils the secondary wire of which is of smaller section and capacity.

Röntgen-ray tubes should be excited during exhaustion with a

¹ The last clause in original text is doubtful in reading. Perhaps it will be more correct to render it: "And the family of the intended bride provides her with various sorts of utensils and apparel needful to her nurse and maid-servants in the other world."

coil of the same dimensions as the one that they are ultimately destined to be worked with. This is a point which does not seem to receive sufficient attention from commercial tube manufacturers.

A. A. C. SWINTON.

66 Victoria Street, London, S.W., January 1.

Sesamoid Bones.

JUDGING from a small collection of X-ray photographs made during the year, the female hand seems better provided with sesamoid bones than the male.

In my prints, in the female hand a sesamoid is most often found in the metacarpo-phalangeal joint of the little finger, less frequently in the index: in one case there are two in the interphalangeal joint of the thumb; in this hand, including the two always found in the metacarpo-phalangeal joint of the thumb, there are no less than six sesamoids. In male hands the bones seem to be more evenly divided between the index and fifth fingers. In most cases the sesamoids are larger in the female hand.

F. J. REID.

December 26, 1896.

Discharge of Electricity by Phosphorus.

THE discharging power for electricity of slowly oxidising phosphorus appears to have been known for much longer than Messrs. Elster and Geitel (see p. 155) seem to be aware of.

In the 1855 edition of the "Encyclopædia Britannica," vol. viii. p. 622, an apparatus is described for collecting atmospheric electricity, first used by Matteucci, in which a piece of phosphorus projecting from a glass tube is connected to an electrometer by a long wire, and exposed to the air whose electrical state is to be investigated. It is said to have been found very useful for this purpose.

J. R. ASHWORTH.

Rochdale, December 26, 1896.

Shooting-stars observed on January 2.

THIS morning, between six and seven o'clock, there has been a very unusual number of shooting-stars. The radiant point was somewhere near Corona. I saw, on the whole, two or three dozen. The brightest was not much inferior to Jupiter.

Sheffield, January 2.

H. C. SORBY.

THE GEODETIC SURVEY OF SOUTH AFRICA.¹

THE Report on the Geodetic Survey of South Africa, presented to both Houses of the Cape Parliament, and printed in Blue-book form, is interesting and important. It is a record of geodetic work well planned and ably carried out, and it has a permanent value, not only from a scientific point of view, but as an accurate basis upon which all future surveys of the country may be confidently founded.

Soon after his appointment as H.M.'s Astronomer at the Cape in 1879, Dr. Gill recommended that a geodetic survey should be commenced, and formulated a scheme "for a gridiron system of chains of principal triangulation extending over the Cape Colony, the Orange Free State, Natal, and the Transvaal." His recommendations were cordially supported by Sir Bartle Frere and Sir George Colley, then respectively Governors of the Cape Colony and Natal; but it was not until June 1883 that the work was fairly commenced, by the measurement of a base-line in Natal. On the completion of this operation, severe pressure was applied by the Government of Natal to accelerate the work at the expense of accuracy; and on two subsequent occasions the question of suspending the survey was seriously considered. It was no easy task to convince Governors and Ministers that true economy lay in "basing all future surveys upon a principal triangulation of such accuracy, that its results might be

¹ "Report on the Geodetic Survey of South Africa." Executed by Lieut.-Colonel Morris, R.E., C.M.G., under the direction of David Gill, H.M.'s Astronomer at the Cape. Parliamentary Paper. Pp. xii + 291. (Cape Town: Richards, 1896.)